

DIFFERENCES IN STUDENT ACHIEVEMENT IN COMPREHENSION  
//  
AS A RESULT OF THE USE OF A PROBING TECHNIQUE

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A Dissertation  
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by  
Anita Jones  
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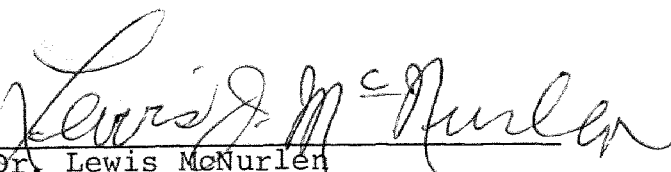
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DIFFERENCES IN STUDENT ACHIEVEMENT IN COMPREHENSION  
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An abstract of a Dissertation by  
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May 1984  
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The problem. The problem was to determine whether a specially designed probing technique had an influence on student achievement scores on the Iowa Test of Basic Skills.

Procedures. Data were gathered on the types of questions teachers asked students. From these data teachers were selected to participate in an inservice on probing techniques and the use of these techniques in their teaching strategies. The purpose of this data was to ascertain whether there was significant mean growth in student achievement scores on the Iowa Test of Basic Skills with students who received instruction from teachers utilizing the probing technique. The data gathered from this comparison was used to test the hypothesis. Additional analyses were completed by using t tests to test for differences between means and a two-way Analysis of Variance. The analyses were to determine if the means of the control and treatment groups were significantly different.

Findings. There were significant differences between the mean scores in the control and treatment groups. Teachers who participated in the probing technique posed higher level questions to students than those teachers in the treatment group. Descriptive statistics further indicated that the mean post-test score was higher for the students who received instruction from the teachers in the treatment group. t Tests indicated that students' post-test scores in the treatment group were significantly higher. Finally, two-way Analysis of Variance revealed that there were no significant interactions between the variables.

Conclusions. It was concluded that the probing technique had a significant impact on student achievement scores from pre- to post-test in the treatment group.

Recommendations. It was recommended that: (1) additional investigation be conducted using a larger and random sample, (2) further investigation be made of probing techniques as a viable instructional tool in improving comprehension.

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## CHAPTER ONE

### Introduction

The attempt to define the reading process has long been debated. Wilma H. Miller illustrates this point in the statement that "The term reading has been applied to such a wide range of behaviors that it has ceased to have a single identifiable meaning."<sup>1</sup> This statement most aptly describes the difficulty that reading specialists and researchers have encountered in their quest for a practical and workable definition of the reading process. In examining some of the findings that researchers have accumulated, Smith and Barrett suggested a definition which reading specialists and researchers find acceptable as a foundation for a definition of the reading process. The definition which, over the years, has emerged as the most widely accepted one is offered by DeBoer and Dallman which includes word identification and comprehension as integral parts of reading.<sup>2</sup> This statement supplies reading specialists and

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<sup>1</sup>Wilma H. Miller, ed., Elementary Reading Today: Selected Articles (New York: Holt Rinehart and Winston, 1972), p. 8.

<sup>2</sup>Richard J. Smith and Thomas C. Barrett, Teaching Reading in the Middle Grades (Reading, Mass.: Addison-Wesley, 1979), p. 107.

researchers with a basic description of the behaviors necessary in the reading process. The ability of the individual to read the printed word and assign meanings to those printed words or symbols emerges as a general definition of the reading process. Hilda Taba reiterated this important issue when she wrote:

that the concepts of the cognitive tasks together with the principles which govern the development of cognitive skills have interesting implications for the formulation of teaching strategies.<sup>1</sup>

The marriage of comprehension theory and practice must occur if teaching strategies are to be effective in the teaching of comprehension. Taba's study, conducted with elementary school children, which looked at thinking indicated even more clearly the necessity for including teaching practice and theory in comprehension instruction. In the study:

two groups of teaching functions were identified which seemed to affect the development of cognitive skills, either positively or negatively. First are questions or statements made by teachers or the students which are psychological or managerial in their function and unrelated to the logic of the content, second, are teacher questions or statements which give direction to discussions and are related to the logic of the content and of the cognitive operations sought.<sup>2</sup>

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<sup>1</sup>Hilda Taba, "The Teaching of Thinking," Elementary English, 42 (1965), 538.

<sup>2</sup>Ibid., p. 539.



Taba's study went even further than the amalgamation of theory and practice. It provided evidence that the kinds of questions that teachers ask students are important in comprehension instruction.

### Rationale for the Study

Comprehension emerges as one of the major outcomes of the reading process. However, the gap between practice and theory in reading comprehension remains wide. Delores Durkin clearly illustrated the gap between teaching comprehension practices, as utilized in the classroom, in the findings of her study. Durkin concluded that teachers spent virtually no time on comprehension instruction. Teachers' instruction focused on assessment, assignment giving, and the skills related to comprehension.<sup>1</sup> Frederick Smith concurred with Durkin's observation with the statement that:

The Durkin study says rather clearly that all too little is known about teaching for reading comprehension--that, when one probes into instructional practices associated with comprehension, the road is foggy at best. Systematic observation of activities in the elementary classrooms in this study revealed that little time was given to activities which could<sup>2</sup> be classified as comprehension instruction.

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<sup>1</sup>Delores Durkin, "Reading Comprehension Instruction," Reading Research Quarterly, 4 (1981), 501-43.

<sup>2</sup>Frederick R. Smith, "Alec in Reading Land; Some Reactions to and Implications of the Durkin Findings," Reading Research Quarterly, 4 (1978-79), 534-38.

The emerging importance of lessening the gap between the practice of teaching reading comprehension and the theories utilized in comprehension instruction is evident.

The kinds of questions that teachers ask students influence the thinking of students. Ruddell emphasized this idea when he asserted: "that on the basis of the available evidence we may conclude that questions and questioning strategies can be a valuable instructional tool to develop the child's cognitive ability."<sup>1</sup>

#### Statement of the Problem

This study determined what influence the use of a specially designed probing technique exerted on student achievement in reading comprehension.

#### Hypothesis of the Study

Data was collected to test the following hypothesis:

There is no difference in student achievement comprehension scores regardless of whether or not their teachers were trained in and used specially designed probing techniques.

The following were the limitations of the study:

1. The student's sample was composed of those students involved in a remedial reading instruction program who were two or more years below grade level.
2. Teacher participation was on a volunteer basis.

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<sup>1</sup>Robert B. Ruddell, Reading-Language Instruction: Innovative Practices (Englewood Cliffs, N.J.: Prentice-Hall, 1974), p. 367.

### Assumptions of the Study

All teachers in the Chapter One reading program were observed and found to be equal in their use of questioning at a literal level. The student population was homogeneous in that criteria for participation in the program was based on reading scores that indicated that students were two or more years below their expected reading level.

### Definition of Terms

Probing. Effective use of the four levels of questioning to facilitate comprehension skills. The four levels of questioning were:

Literal. This refers to questions/statements which guide the respondent toward acquisition of the direct, stated meaning.

Interpretive. The use of questions/statements which use the literal, stated information and supplies meanings not directly stated. These questions help the respondent in identifying details and making inferences.

Critical. The use of questions/statements which require the respondent to judge the accuracy of information, distinguish between facts and fiction, identify and analyze techniques for persuasion.

Creative. The use of questions/statements which allow the respondent to create new ideas from the material. The respondent involves him/herself in the material and/or extends the material.

Data for this study was handled in a descriptive manner. In addition to the narrative presentation of the data, tables were used for the correlated t test data. Findings of this study should be of use to educators who are responsible for the development of comprehension skills in reading. Hopefully, instructors will find the results useful for meeting individual needs of students.

## CHAPTER TWO

### Review of the Literature

#### Introduction

There is much evidence to suggest that comprehension is a critical outcome of the reading experience. The evidence further suggests that reading specialists and researchers agree that comprehension is the foundation of reading; however, educators do not really facilitate the learning of comprehension in practice. Educators tend to teach a variety of subskills such as word identification, main idea and word analysis. Delores Durkin expressed this notion of the ineffective teaching of comprehension in the reading process when she wrote:

As it happens, however, what is known about the comprehension process is meager and inconclusive. That is why so much of what is called "comprehension instruction" is concerned not with the process of comprehending but with its products.<sup>1</sup>

The purpose of Durkin's study was designed to assess whether comprehension instruction was provided and how much time was utilized for comprehension instruction in elementary school classrooms.

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<sup>1</sup>Delores Durkin, Teaching Them to Read (Boston: Allyn and Bacon, 1978), p. 418.

The findings of the study revealed that less than 1 percent of teacher time was directed toward comprehension instruction during the reading period, that little or no time was actually given to comprehension instruction, and that the student behavior predominantly observed had them as listeners or assignment doers with little time devoted to actual reading. Another important finding indicated that comprehension instruction was practically neglected for very little time was set aside for it in elementary classrooms.<sup>1</sup>

More often than not, the preoccupation of educators with product causes them to place the comprehension process within very narrow parameters. Furthermore, failure by teachers to facilitate the acquisition of comprehension skills within the thinking arena, greatly limits the kind of thinking students are able to employ in the reading situation. Myles I. Friedman and Michael D. Rowls reiterated this point when they stated that:

It is important to realize that comprehension is a product of thinking. Thinking enables readers to comprehend what they are reading. So when teachers teach comprehension, they are actually teaching the programmatic thinking skill that is used to comprehend the reading material.<sup>2</sup>

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<sup>1</sup>Durkin, "Reading Comprehension Instruction," pp. 482-533.

<sup>2</sup>Myles I. Friedman and Michael D. Rowls, Teaching Reading and Thinking Skills (New York: Longman, 1980), p. 155.

The absence of the facilitation of comprehension as a product of thinking is and should be a major concern of reading specialists and researchers. In light of what is known about learning, it is crucial that teachers incorporate and apply this knowledge to comprehension.

Thinking development theory provides a conceptual framework for looking at the thinking process and its relationship to the reading process. It establishes a firm connection between thinking and comprehending. One such theory is described by Larry A. Harris and Carl B. Smith.

From the time he is born, the child is constantly bombarded with stimuli. Events and information gathered by the senses and impressions are fed to the brain. A great deal of speculation and research has been done to explain how the child begins to deal with the flood of data his environment provides. It seems fairly certain that each individual event or piece of information cannot be handled as a unique and novel incident. Apparently the child, even as an infant, begins to develop some structure for ordering his perceptions, mental categories develop, and stimuli are encountered and categories grow to include these data. Eventually new categories are created as the type and number of stimuli require them, and as a child's growing understanding of his environment permits this. Through a process of generalization and discrimination the child brings some order to his world. The child's structure for dealing with the world orders his perceptions.<sup>1</sup>

If in the stages of pre-reading development a child is provided with effective direction and guidance toward

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<sup>1</sup>Larry A. Harris and Carl B. Smith, Reading Instruction Diagnostic Teaching in the Classroom (New York: Holt Rinehart and Winston, 1976), p. 73.

categorizing and ordering stimuli received from the environment, then children can be expected to comprehend actively in the reading process. The more able the child becomes at processing input received from his/her environment the more skilled a child will be in learning the formal reading process; thus, the more skilled and knowledgeable must the teacher be about the thinking process and its impact on the reading process. This idea was advanced by Harris and Smith when they stated:

As the child grows and matures, his way of ordering his observations changes. More and more broader experiences with objects and people explain this change, in part, but the child grows in his ability to deal with abstractions.<sup>1</sup>

Thinking, as evidenced by Harris and Smith and others, emerges as a critical component in the reading process. It is the component upon which the outcomes of reading are based. Teachers must move from product outcomes in teaching comprehension and provide a climate and teaching process that is conducive to generating thinking on the part of the learners. Harris and Smith elaborated on this contention by pointing out that:

Certain conditions can facilitate cognitive growth. These include an environment that encourages exploration, manipulation of objects, and "play;" peers and adults interact with the child; and curricular from logical step to larger logical step. The learner's interactions

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<sup>1</sup>Harris and Smith, p. 73.



with the environment should provide an opportunity to encounter cognitive conflicts that in turn will facilitate growth at the time he is ready to expand or refine his conceptual framework.<sup>1</sup>

In teaching comprehension, teachers must provide experiences and opportunities for children that involve them in comprehension rather than drills and exercises that merely assess comprehension. More importantly, teachers must provide children with adequate practice time in the effort to facilitate thinking. The need for movement by teachers from product to process is most aptly stated by Nila Banton Smith: "we as teachers in general know full well that we should be teaching children to think, that we should be providing practice to develop thinking skills higher than those involved in memorization."<sup>2</sup>

If children are to be thinkers, then teachers must provide opportunities for children to engage in comprehension activities, be given adequate practice time for doing these activities, and be made aware of the purpose of the reading act so that they are aware of reading as communication. This idea is discussed by Wayne Otto, Robert Rude, and Dixie Lee Spiegel when they stated that:

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<sup>1</sup>Harris and Smith, p. 74.

<sup>2</sup>Nila Banton Smith, "The Many Faces of Reading Comprehension," in Individualizing Reading Instruction, ed. Larry A. Harris and Carl B. Smith (New York: Holt Rinehart and Winston, 1972), p. 210.

The most important step in preparing children to comprehend written material is to help them understand that reading is a communication process. The symbols on the page are supposed to give a message to the reader. Tobey (1976) suggests that one important component of this process is helping children to understand why they are reading.<sup>1</sup>

The act of reading comprehension is tied to the thinking learning process. Teachers cannot, considering what one knows, continue to teach comprehension in isolation. Frank Smith reminds us that:

Comprehension may be regarded as relating what we attend to in the world around us--the visual information of print in the case of reading--to what we already have in our heads. Learning can be considered as modifying what we already have in our heads. As a consequence of attending to the world around us, we learn to read, and we learn through reading, by adding to what we already know. Thus comprehension and learning are fundamentally the same process.<sup>2</sup>

If reading comprehension is the goal, then teachers must incorporate existing theories and information into their instructional practices. Comprehension instruction must emerge as those practices that are based on sound thinking and learning theories.

Because comprehension is so intertwined with thinking,

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<sup>1</sup>Wayne Otto, Robert Rude and Dixie Lee Spiegel, How to Teach Reading (Reading, Mass.: Addison-Wesley, 1978), p. 160.

<sup>2</sup>Frank Smith, Understanding Reading, A Psycholinguistic Analysis of Reading and Learning to Read (New York: Holt Rinehart and Winston, 1982), p. 53.

it is imperative for teachers of reading to alter their approach to teaching reading comprehension, and to provide opportunities and experiences for learners to participate in the process of comprehension as active and independent thinkers. Harris and Smith affirmed this concept when they stated that:

As a teacher of reading you will want to involve children in activities that help them think as they read. To do that you need some understanding of how thinking abilities develop, and what the teacher can do to assess and help develop children's thinking.<sup>1</sup>

The understanding, by teachers, of the thinking process and the involvement of students in that process is critical in the teaching of reading comprehension. Because of the major importance of thinking in the comprehension process, teachers must have some logical method of applying their knowledge of thinking to provide experiences which are conducive to creating independent higher level thinkers. Harris and Smith described a process of ordering the thinking process involved in reading that provides the teacher with a conceptual framework from which to operate.

We believe the needs of teachers and children can best be met by seeing the thinking process in terms of four operations: identifying, analyzing, evaluating, and applying . . . At the most basic level a reader must be able to identify the ideas on the printed page. To do this he must draw on immediate memories or perceptions. Apparently one's perceptions are very much

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<sup>1</sup>Harris and Smith, p. 73.

dependent on the person's stage of cognitive development. At the next higher level of understanding the reader must analyze the message. This involved examining the parts, studying the organization, and seeing the relationships. At a third level the reader must evaluate the ideas gained from reading. This involves the use of standards in arriving at judgments. The reader determines the authenticity or quality of an idea or point of view. Finally, the reader applies what he has read to solve a problem or answer whatever question(s) were raised prior to reading. Information may also be rejected or stored for use at some later date.<sup>1</sup>

The application of Harris and Smith's thinking classification is quite helpful for teachers of reading in that it suggests a framework for amalgamating learning theory and teaching application. The role of the teacher and the questioning techniques utilized by the teacher emerges as a major focus in comprehension instruction. Harris and Smith further explain that:

Each of these thinking processes builds on previous levels. The development and effective use of these thinking processes in the reading act are dependent, in part, on opportunities for children to engage in activities that call for various kinds of thinking, interaction with peers and adults who employ various thinking processes is a necessary condition of such activities . . . The kinds of questions teachers ask and encourage children to ask also seem important to the kind of thinking children will practice. We believe teachers who have some fundamental idea of comprehension and thinking--one that is simple enough so that the major parts can be remembered--tend to ask and encourage better questions and set classroom conditions that promote a higher level of thinking.<sup>2</sup>

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<sup>1</sup>Harris and Smith, pp. 75-76.

<sup>2</sup>Ibid., p. 76.

If teachers are to be effective facilitators of comprehension and thinking, their practices and strategies must be designed so that they provide children with a sound base for questioning and thinking. The importance of the questions that teachers ask students and the questions that students are encouraged to ask are critical to the cultivation of higher level thinking skills. P. David Pearson and Dale D. Johnson stated that:

Questions have been a mainstay of reading comprehension instruction for decades. However, simply because questions are asked is no evidence of their quality, importance or appropriateness. In fact, Guszak (1967) demonstrated that students were best at answering the types of questions teachers asked most often (factual recall). Guszak's findings are an argument against particular questioning strategies not against questioning in general.<sup>1</sup>

The utilization of the question as a mere eliciting of right or wrong responses does not foster thinking on the part of children. Rather, as Pearson and Johnson stated it is the kind or nature of the question that fosters independent critical thinkers. The importance of the question as a valuable tool in comprehension instruction is further documented by Ruddell's reference to Taba in regard to the use of the question when he wrote that:

A basic and commonly accepted tool used to stimulate thinking and enhance the cognitive process and comprehension ability is the question.

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<sup>1</sup>P. David Pearson and Dale D. Johnson, Teaching Reading Comprehension (New York: Holt Rinehart and Winston, 1976), p. 154.

The research of Taba supports the view that the teacher through questioning strategies, elaboration of ideas and appropriate feedback and reinforcement, can, indeed, influence the critical thinking ability of elementary school children.<sup>1</sup>

The emergence of the question as a major component of comprehension instruction has far-reaching implications for teachers of reading. Otto, Rude, and Spiegel affirm this. They asserted that:

Probably the most important means of guiding children's comprehension is questioning, by the teacher. Through questions, teachers can help children refine their answers, find support for their hypotheses, and look at the problems in new ways.<sup>2</sup> The quality of the question is all important.

This assertion on the importance of the question as a vehicle surfaces again and again in the literature. More often than not the kinds of questions asked by teachers do not require children to respond past the level of literal comprehension, a skill which merely requires the learner to provide feedback on the stated or obvious information contained on the printed page. The quality of the questions asked by teachers do not require the learner to think beyond what is written on the page.

In examining questioning beyond the literal level, Otto, Rude, and Spiegel reasoned that:

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<sup>1</sup>Ruddell, p. 366.

<sup>2</sup>Otto, Rude, and Spiegel, pp. 165-66.

Guiding children to comprehend what they read involves more than asking yes-no questions or putting check marks and smiling faces on their workbooks. Knowing the "rightness" or "wrongness" of an answer is only a beginning. In fact, in some of the most valuable comprehension exercises, there are no definite right answers. What the student really needs to know is how to arrive at an answer and how to support that answer.<sup>1</sup>

The agreement, of reading specialists and researchers, that the kinds of questions teachers ask students are predominately at the literal or recall level is alarming. A 1967 study conducted by Frank Guszak illustrated this point most aptly.

Guszak's study involved the observation of second, fourth, and sixth grade teachers and their assigned students during their reading groups. The observers utilized a field tested reading comprehension question and response inventory.

The findings from the study indicated that 56.9 percent of the questions asked by teachers were recall level questions; the question-response congruence was highest at the conjecture level which called for responses dealing with anticipatory thought rather than rationale or what if kinds of responses; and that out of 142 question response episodes, sixty-seven were aimed at the setting purpose follow-up.<sup>2</sup>

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<sup>1</sup>Otto, Rude, and Spiegel, p. 164.

<sup>2</sup>Frank J. Guszak, "Teacher Questioning and Reading," Reading Teacher, 21 (1967), 227-37.

The implication of Guszak's study is most aptly stated by Barrett and Smith in the following statement:

Guszak in his 1967 study on reading comprehension drew two pertinent conclusions. First, teachers in the study placed excessive emphasis on literal questions, regardless of the nature of the materials or ability levels of the students involved. Second, teachers did not use inferential and evaluative questions to a greater extent because Guszak found that they did not have a clear conceptualization from which to work.<sup>1</sup>

The conclusions from both Durkin's and Guszak's studies provide evidence that the kinds of questions children are asked and the types of activities that children were expected to perform did not really focus on comprehension beyond the literal or recall level. It can also be concluded that the teaching of comprehension is assessed as product rather than a meaningful thinking process. The crucial relevance of the question in comprehension instruction is uncontested. However, it is the kinds of questions that teachers fail to ask students that become the issue. Bloom reiterated this contention when he stated that:

In discussing the function of instruction questions, Bloom cites Anderson who "emphasizes that . . . the most compelling stimulus in a program frame is the questions which must be answered or the blank which must be completed." Instructional questions might thus exercise an important function in influencing the effective stimulus properties of a document.<sup>2</sup>

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<sup>1</sup>Smith and Barrett, p. 62.

<sup>2</sup>Richard D. Bloom, "Effects of Questioning on the Learning of Written Instructional Materials," in Reading Methods and Teacher Improvement, ed. Nila Banton Smith (Newark, Del.: International Reading Association, 1970).



Only when the questioning process leads toward divergent and independent thinking is it a viable tool for comprehension instruction. Teachers must be more than elicitors of recall responses and mere memorization responses from students. Cheek and Cheek elaborate on this notion by citing Taba. They stated that:

Taba found that teachers tend to pour out information to students and, as a result of the low level of questioning, encourage them to recite this material back almost word for word. She felt that thinking was incorrectly perceived as a "global" process which seemingly encompassed anything that goes on in the head, from daydreaming to constructing a concept or relativity.<sup>1</sup>

This penchant, on the part of teachers, for asking questions primarily at the literal level is and should be of major concern to reading specialists and researchers. The lack of questioning, by teachers, at higher levels is a severe blow to the facilitation of higher level thinking and comprehension acquisition on the part of the learner. Friedman and Rowls underscored this concept when they indicated that:

Several studies point to the inadequacies of instruction beyond the literal comprehension level. Gallagher (1965) reported the results of a study designed to assess the level of comprehension dealt with most in the teaching of social studies. He found that literal understanding was the process observed most often. Davis and Tinsley (1967) conducted a study to determine the range of

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<sup>1</sup>Martha Collins Cheek and Earl H. Cheek, Jr., Diagnostic-Prescriptive Reading Instruction (Dubuque, Ia.: William C. Brown, 1980), p. 292.

cognitive objectives manifested in secondary school social studies classrooms from questions asked by student teachers and their pupils. The results revealed that both teachers and pupils asked more questions involving remembering literal statements than all other questions.<sup>1</sup>

Since the quality of questions asked by teachers is critical to the comprehension process, it is imperative that teachers concern themselves and become familiar with quality questioning strategies. The purpose of questioning should not be to answer for the sake of answering, but rather to develop thinking skills and to challenge learners to evaluate, make inferences, and judgments about what they have read.

If comprehension is the desired outcome of reading, more attention must be given to the kinds of questions teachers ask and their interrelatedness to the kinds of thinking learners will do. Frank Smith paid particular attention to the matter when he stated that:

Comprehension is the very heart of the reading act. There is no use in reading unless one understands the meanings . . . with this strong present movement in education toward the development of inquiry, questioning, reasoning, evaluating, we in the field of reading, have an entirely new horizon opened to us. We must find out how better to use the content of reading in developing ability to think in depth.<sup>2</sup>

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<sup>1</sup>Friedman and Rowls, p. 155.

<sup>2</sup>Smith, Understanding Reading: A Psycholinguistic Analysis of Reading and Learning to Read, p. 53.

In effect, reading must become more than a repetition of words from a printed page or the response by learners to obvious stated information. Reading teachers must continually engage learners as active independent thinkers. Otto, Rude, and Spiegel imparted this notion when they stated that:

Reading is not just saying the words, reading must always be a meaning-getting process. Many children can read the words in a passage correctly, but are unable to answer that call for making inferences or for identifying the main idea.<sup>1</sup>

### Conclusions

The literature suggests that comprehension is a critical outcome of the reading and thinking process. Yet teachers are not effectively facilitating comprehension and higher level thinking skills within the learners. The achievement of expected comprehension outcomes in the reading process rests on the kinds and quality of questions that teachers pose to students. Martha and Earl Cheek have suggested that:

Comprehension is a thinking process. It is important for teachers to assist students in developing their ability to think to the highest degree possible. One of the problems inherent in the teaching process in the elementary grades is that students are not given the opportunity to develop their cognitive abilities as highly as possible because of the questioning strategies used by some teachers. Often elementary students

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<sup>1</sup>Otto, Rude, and Spiegel, p. 147.

are asked low-level literal questions. These questions require only basic knowledge and result in one or two-word answers. These literal-level questions force students to read strictly for main ideas, specific details and other such information. Rarely are students asked to synthesize and evaluate the information read. As a result, they do not develop their thinking skills to the highest possible degree.<sup>1</sup>

Consequently, if students are to develop higher level thinking skills in relationship to reading comprehension, teachers must utilize their knowledge of learning and re-examine their strategies for building strong comprehension skills. Harris and Smith advocated that:

The classroom should be an environment that stimulates exploration and discovery. The child should be an active agent in the environment, pursuing questions that have relevance and meaning to him personally. Divergent thinking is given equal time, and the child's level of cognitive development is acknowledged in the classroom that is child centered.<sup>2</sup>

This idea of perpetuating an environment that allows children time and practice in the area of critical thinking is not new. It has merely been overlooked because of the preoccupation of educators for securing the right or wrong answer. In practice, teachers have narrowed down the comprehension process to the assessment of facts that children may have retained at some given point in time. While the instructional objective was the facilitator of

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<sup>1</sup>Cheek and Cheek, pp. 291-92.

<sup>2</sup>Harris and Smith, p. 82.

critical thinkers, practices were geared at mastering the present content. What the instructional program and practice ought to provide is described by Ruddell as:

A major objective of the instructional program is the development of reading and listening comprehension abilities that will enable the child to effectively derive, interpret, and apply meaning. In addition, the child must be able to interpret information at the factual level as literal meaning is derived, at the interpretive level as content is modified and understood, and at the applicative level as information is transformed, comprehended, and applied to new situations.<sup>1</sup>

The need for children to acquire skills that enable them to think, refine and apply existing knowledge to new situations is critically important. In order for students to acquire these skills, teachers must review and revise their teaching practices and strategies in that area of comprehension development to reflect the needs of students as thinkers.

In order for learners to display higher level thinking skills, teachers must adopt strategies and provide environments that permit the learners to develop these skills.

Cheek and Cheek said that:

Improving the thinking process must be an integral part of the reading process. In order to improve thinking, the questioning strategies teachers use must be improved. Higher-level questions assist students in developing their thinking abilities by

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<sup>1</sup>Ruddell, Reading-Language Instruction: Innovative Practices, p. 361.

encouraging them to examine more critically the material that they read. Examining information critically requires a higher level of thinking, which in turn improves comprehension.<sup>1</sup>

If improving the thinking process is an integral part of the reading process, then it is indeed essential that teachers look at the kinds of questions they ask students and provide an environment, the time, and opportunity for children to develop those skills.

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<sup>1</sup>Cheek and Cheek, p. 292.

## CHAPTER THREE

### Methodology

#### Setting for the Study

According to the Des Moines Chamber of Commerce, Des Moines, Iowa, the capital and largest city in the state and its suburbs, has a population of approximately 350,000 within its corporate limits of 1,136 square miles. Des Moines houses such businesses as manufacturing, warehousing, retailing, major service industries, banking, insurance and publishing companies. It is also one of the nation's leading agri-business centers. The area is served by eleven public school districts and five parochial school districts.<sup>1</sup>

The Des Moines Independent Community School District employs approximately 3,400 people. The student enrollment for fiscal year 1982-83 was 31,641. There are six high schools, ten junior high schools, forty-three elementary schools, and sixteen non-public schools.<sup>2</sup>

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<sup>1</sup>Greater Des Moines Chamber of Commerce Federation, Des Moines Area Profile (Des Moines, Ia.: Chamber of Commerce, 1983), p. 2.

<sup>2</sup>Des Moines Public Schools, Little Fact Booklet (Des Moines, Ia.: Tech Printing, 1983), pp. 7-8.

### Project Description

During the 1964-65 school year, results of the Iowa Tests of Basic Skills revealed that significant numbers of students in Des Moines schools located in areas with high concentrations of low income families were not acquiring the reading skills expected of students of similar age and grade. In 1966, the Des Moines Public Schools implemented a remedial reading program for the purpose of providing additional individualized reading instruction to those students who met the criteria established for participation in the program.

The program was funded under Title 1, Elementary Secondary Education Act legislation which provided funds to local educational agencies for programs for educationally disadvantaged children. In the Des Moines School District, free and/or reduced price lunch data are used to designate the school attendance areas that are eligible for service.

As the program was developed and modified, it emphasized supplemental small group reading instruction for students in grades two through ten who performed below the level normally expected of students of similar age or grade placement.

The reading program was designed to supplement the district's reading curriculum. The Systematic Approach to Reading Improvement (SARI) management system is used by the regular classroom teachers to ensure that uniform basic



reading skills are taught and monitored in all elementary schools regardless of the basal reading series used. This management system which was developed by a group of teachers in California, is published by Phi Delta Kappa. SARI, which is not copyrighted, can be used as published or adapted to meet the needs of a district's reading program. SARI consists of sequentially developed objectives and criterion-referenced tests which measure critical reading skills by instructional level in the areas of vocabulary, word analysis and comprehension for grades one through seven. Students in grades one through seven are selected for participation in the program based on their achievement level in SARI. Students in grades eight through ten are selected on the basis of their instructional level on the basal reading program, or on an Informal Reading Inventory.

#### Organization for Instruction

Each full-time Chapter One teacher serves a maximum of forty students daily. Flexibility is an important aspect of the instructional organization plan. The Chapter One teacher has the option of working either in a designated area in the regular classroom or in an assigned room of his/her own. Group size varies from one to eight and may not exceed eight students each instructional period. Chapter One students receive twenty-five to thirty minutes of supplementary reading instruction five days a week in

the elementary and forty to fifty minutes in the middle school and senior high school. The basis for grouping is the instructional reading level, grade level and skill needs of the students. In compliance with Chapter One regulations, students receive the same amount of direct reading instruction time from the classroom teacher as do all district students.

The Iowa Test of Basic Skills (ITBS) is used by the Des Moines School District to evaluate its Chapter One reading program. Students are administered a pre-test in the fall and a post-test in the spring to measure program effect in reading.

#### Design of the Study

The study was designed to determine if differences exist in the student achievement scores on the Iowa Test of Basic Skills of students who received instruction from teachers who participated in the probing inservice and students who received instruction from teachers who did not participate in the probing inservice. The subjects needed to implement this study were Chapter One reading teachers of students in grades four through eight.

Prior to the inservice provided to teachers, three observers were trained in observing and recording the questioning strategies (probing) used in the classroom by Chapter One teachers. The training was designed so that

the participants were involved in sessions which were geared toward the formulation and analysis of questions at the literal, interpretive, critical and creative levels. The training also provided the opportunity for the participants to develop the parameters and practical definitions for the four types of questions. In addition, staff were trained in the use of Tierney's Reading Observation Scale, 1976.<sup>1</sup> (See Appendix.) Upon completion of the training preliminary, observations were made and indicated that teachers generally asked literal level questions.

The program coordinators were expected to observe and evaluate Chapter One reading teachers on a regular basis. Classroom visits of Chapter One teachers by their coordinators occurred a minimum of every other week. It was felt that since teachers would be accustomed to regular visits by the coordinators the purposes of this study would not be compromised in terms of changing the teaching conditions for the control and treatment groups.

#### Sample and Population

In the Des Moines Public School District, the Chapter One reading programs were organized at twenty-three elementary schools and six secondary schools. Teachers were

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<sup>1</sup>Robert J. Tierney, John E. Readence, and Ernest K. Dishner, Reading Instruction and Practice Guide for Improving Instruction (Boston: Allyn and Bacon, 1980), p. 240.

recruited on a volunteer basis to participate in the study. Six teachers elected to participate and received intensive inservice training in the probing technique. The student sample for the treatment group was generated based on their placement in the classes of teachers who volunteered to participate in the study. The sample for the teacher control group was based on the availability of teachers in the program who taught grades four through eight. Students in the control group were again selected on the basis of their placement in the classes of these teachers.

#### Treatment Procedures

The major focus of the inservice centered on providing information and training to teachers designed to change the questioning pattern teachers used with students. The training was designed to make teachers aware of their present questioning strategies of using literal level questions in their daily teaching and to provide them with strategies that trained them to ask questions that required student responses at the interpretive, critical, and creative levels of questioning.

Teachers attended four one-hour workshops during November and December. The first two workshops were aimed at training teachers to ask guided questions designed to stimulate higher level thinking by students specifically and posing questions to students that required responses

that extended beyond the literal or recall level. The purposes of the follow-up workshops were to provide modeling for questioning techniques and to provide practice for teachers in utilizing questioning techniques. Teachers were asked not to disclose the contents of the inservice with other teachers so as not to compromise the results of the study.

### Treatment Implementation

From January through May teachers who participated in the inservice were observed in order to ascertain whether or not the probing technique was being utilized. Teachers in the control group were also observed. The observations were taped for the control and treatment groups. Each tape was analyzed by the observers using Tierney's Reading Observation Scale. Modification of the scale was necessary in order to categorize the teacher behaviors under four headings: literal, interpretive, critical and creative. Teacher behaviors 1, 4 and 6 were categorized as literal; 5a, 7 and 8 as interpretive; 5b and 5c as critical; and 2 was categorized as creative.

### Analysis of the Data

Correlated t tests were used to test for differences between means. Means and standard deviations of pre- and post-test ITBS scores were computed; differences between means were analyzed. A .05 level of significance was used to reject the null hypothesis.

## CHAPTER FOUR

### Data Analysis

The first step was to determine if teachers were utilizing a probing technique in their current teaching strategies with any regularity. This assessment was made by having three trained observers visit program teachers' classrooms and recording the number and kinds of questions, on a checklist, teachers asked students. Each of the teachers were visited by an observer at least once. Upon completion of the observations by the three observers, the results were tabulated. The results indicated that teachers were generally low probers. The results of the observations are displayed in Table 1.

Teachers were found to ask literal level questions 77 percent of the time. Higher level questions were asked 22 percent of the time.

Results indicated that the treatment group utilized the training received at the inservice in posing questions to students that went beyond the literal or recall level, while teachers in the control group asked literal level questions 68 percent of the time (Table 2).

Table 1  
Observations of Kinds of Questions Asked by Teachers

	Observer 1		Observer 2		Observer 3	
	Number of Questions	%	Number of Questions	%	Number of Questions	%
Literal	69	77	62	78	71	82
Interpretive	12	13	8	10	10	11
Critical	4	4	6	8	3	3
Creative	5	6	3	4	3	3
Total Number of Questions	90		79		87	

Table 2  
Treatment/Control Observations

	Treatment	Control
Literal	28%	68%
Interpretive	41%	22%
Critical	21%	6%
Creative	10%	4%
Total	100%	100%

The Iowa Test of Basic Skills (1979), Form 8, of the survey battery, was given on a pre-test/post-test basis in October and May of the 1982-83 school year. Table 3

displays the number of subjects in the control and treatment groups and their mean and standard deviation scores from pre- and post-tests.

Table 3

Means and Standard Deviations of Pre-test/Post-test  
Scores from the Iowa Test of Basic Skills

	Treatment	Control
<u>Pre-test</u>		
Number	163	161
Mean	32.004	33.138
Standard Deviation	12.960	11.600
<u>Post-test</u>		
Number	163	161
Mean	37.375	34.289
Standard Deviation	12.461	11.139

Displayed in Table 3 are the control and treatment groups' mean pre- and post-test scores. The pre- and post-test scores for the treatment group showed a mean gain score of 1.151. The pre- and post-test scores for the control group showed a mean gain score of 5.371.

Further findings indicated that for the treatment group 163 cases, sixth and seventh grade students comprised



28.8 percent and 34 percent of the student sample respectively. For the control group of 161 cases, seventh, fifth and eighth graders comprised 32.9 percent and 21.7 percent respectively as indicated in Table 4.

Table 4

Grade Dispersion of Student Sample for Treatment and Control Groups

Grade	Treatment		Control	
	Number	Percent	Number	Percent
4	24	14.7	15	9.3
5	18	11.0	35	21.7
6	47	28.8	23	14.3
7	56	34.4	53	32.9
8	18	11.0	35	21.7
Total	163	100.0	161	100.0

t Tests were used to test for differences between means of the control and treatment groups. Results of the t tests by grade are indicated in Tables 5 and 6.

Further examination of the difference between means of the total control and treatment groups indicated that there was a mean growth of 3.1 with the t value being significant at the .05 level as indicated in Table 7.

Table 5

NCE Mean Change on Pre- and Post-test Using the t test  
for Treatment Group by Grade

Grade	N	Pre-test		Post-test		Change
		NCE	SD	NCE	SD	
4	24	35.3	14.2	42.3	15.5	7.0
5	18	34.9	11.5	38.8	13.6	3.9
6	47	30.6	13.9	37.0	11.8	6.4
7	56	33.3	12.5	36.0	11.5	2.7
8	18	32.5	10.9	34.7	11.0	2.2

Table 6

NCE Mean Change on Pre- and Post-test Using the t test  
for Control Group by Grade

Grade	N	Pre-test		Post-test		Change
		NCE	SD	NCE	SD	
4	15	31.9	9.7	38.3	8.5	1.4
5	35	32.2	9.6	34.8	8.6	2.6
6	23	28.4	14.1	33.6	12.7	5.2
7	53	35.2	12.9	35.0	11.6	-0.2
8	35	32.3	9.7	31.4	12.5	-0.7

Table 7

Mean Differences Between Treatment and Control Groups  
on Pre- and Post-tests

<u>Pre-test Treatment</u>			<u>Pre-test Control</u>			<u>T</u>
N	Pre-	SD	N	Pre-	SD	
163	32.0	12.9	161	33.1	11.6	0.83
<u>Post-test Treatment</u>			<u>Post-test Control</u>			<u>T</u>
N	Post-	SD	N	Post-	SD	
163	37.3	12.4	161	34.2	11.01	2.35*

\* $p < .05$

The information displayed in Table 7 provides evidence to support that the observed difference between the two sample means was statistically significant.

A two-way analysis of variance was used to further test for significant differences between the means of the groups. Examination of the data obtained revealed that there was no significant interaction between grade and type (treatment/control) and that the main effect of type was significant. These results are displayed in Table 8.

Data in Table 8 provides evidence that there were differences between the treatment and control groups. The null hypothesis was rejected.

Table 8

## Summary Table of Analysis of Variance

Source of Variance	F	Significance Level
Grade	2.1259	Not significant
Type	4.645	.05
Interaction	0.2145196	Not significant

## CHAPTER FIVE

### Summary, Conclusions and Recommendations

The purpose of this study was to determine what effect the use of a specially designed probing technique exerted on student achievement in comprehension as evidenced by pre- and post-test scores from the Iowa Test of Basic Skills. The selection of remedial students was solicited because these students generally do poorly on the comprehension subtest of the Iowa Test of Basic Skills and the goal of the program is to increase student comprehension skills in reading. It was felt that a specific probing technique for increasing the probability of improved student comprehension needed to be used and its effectiveness assessed.

The hypothesis of this study was that there was no difference in student achievement comprehension scores regardless of whether or not their teachers were trained in and used a specially designed probing technique. The problem of the study included assessing whether or not teachers were currently utilizing a probing technique prior to conducting the study and if teachers were utilizing the probing technique once the study was underway.

### Summary

Teachers for the study were identified on a volunteer basis. Teachers of remedial students were asked to volunteer to participate in the inservices and to utilize the skills gained from the inservices in their classrooms. All teachers were observed prior to the inservice to ascertain whether or not they were using probing techniques in their current practices. Three trained personnel observed these teachers and found that probing was not significantly prevalent in their teaching practices.

Teachers in the treatment group were inserviced in the use of a probing technique. The group was asked to implement these techniques in their daily teaching strategies. Trained personnel tape recorded the lessons of teachers in both the control and treatment groups. Personnel analyzed these observations by using a modified version of Tierney's Reading Observation Scale.

The results of the observations from the checklist indicated that teachers who had received the training utilized the probing technique and asked students higher level questions more frequently. Participants in the study asked literal level questions 6 percent of the time, interpretive level questions 41 percent of the time, critical level questions 21 percent of the time and creative level questions 10 percent of the time, while teachers

who did not participate in the training asked literal questions 68 percent of the time.

Descriptive statistics designed to examine measures of central tendencies were used to study the means of both the control and the treatment groups utilizing data obtained from the Iowa Test of Basic Skills pre- and post-test scores. Analysis revealed that the mean for the treatment group was higher.

t Tests revealed that the mean score for the treatment group was 30.6 on the pre-test and 37.0 on the post-test. The mean score for the control group on the pre-test was 28.5 and 33.6 on the post-test. The mean gain from pre- to post-test for the treatment group was higher. The analysis of variance gave further evidence to support that the means of the two groups were different. The null hypothesis that there is no difference in student achievement comprehension scores regardless of whether or not their teachers were trained in and used a specially designed probing technique was rejected.

### Conclusions

Analysis of the data obtained in this study revealed that there was a significant difference in the scores of the students who received instruction from teachers who participated in the training when group means of both the treatment and control groups were examined.

### Recommendations

As a result of the outcome of this study, the following recommendations are offered:

1. Because the population sample was taken from a population identified as disabled readers, it is recommended that further study be undertaken utilizing a larger and random population sample.
2. To further investigate the technique of probing as a viable instructional tool in the student comprehension process.



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1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes the need for transparency and accountability in financial reporting.

2. The second part of the document outlines the various methods and techniques used to collect and analyze data. It includes a detailed description of the experimental procedures and the statistical analysis performed.

3. The third part of the document presents the results of the study. It includes a series of tables and graphs that illustrate the findings of the research. The data shows a clear trend of increasing activity over time.

4. The fourth part of the document discusses the implications of the findings. It suggests that the results have significant implications for the field of study and may lead to further research in this area.

5. The fifth part of the document concludes the study. It summarizes the main findings and provides a final statement on the importance of the research.

## APPENDIX



## READING INSTRUCTION OBSERVATION SCALE

The Reading Instruction Observation Scale affords an analysis of teacher and pupil behavior and an examination of the organizational pattern, activities and materials of reading instruction.

### Analysis of Teacher and Pupil Behavior

To analyze cognitive and affective aspects of teacher and pupil behavior, the Reading Instruction Observation Scale incorporates thirteen categories of behavior. Two criteria were used to select these categories. Behaviors were relevant to reading instruction and were separate from each other.

To use the scale effectively, teachers will find it helpful to keep the nature and purpose of the scale in mind. It is suggested that teachers be familiar with the behaviors analyzed, the method of tabulation, and the intended interpretation.

To record behaviors, and outside observer familiar with the scale and the method of behavior tabulation is essential. It is suggested that an observer can acquire this familiarity after an hour of study and practice with the scale. Once the observer is familiar with the scale, the observational procedures involve following the teacher, and categorizing and tallying the teacher's behavior and the behavior of the students with whom the teacher interacts.

## READING INSTRUCTION OBSERVATION SCALE CHECKSHEET

### Pattern:

1. Whole class...
2. Group...No. of Groups...Teacher works with (Group No.)...
3. Individualized...No. of individual teacher contacts...No. of students involved in individualized activities...

### Activities:

Word-attack skills...comprehension skills...vocabulary activities...listening skills...oral reading...directed silent reading...free reading...study skills...other activities (please specify)...

**Materials:**

Basic series...workbooks...worksheets...supplementary books...periodicals...newspapers...supplementary series...audiovisual aids (please specify)...other materials (please specify)...

Teacher	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Directions																				
Initiates																				
Corrective																				
Criticism																				
Cognitive mem																				
Converge thinking																				
Evaluative thinking																				
Diverg thinking																				
Narrow																				
Accepts																				
Praise or Encouragement																				

Behaviors are categorized every time the behavior changes and every five seconds for any behavior that lasts longer than five seconds. The sequence of behavior is not noted. The minimum suggested observational period is twenty-five minutes. For tabulation purposes, Reading Instruction Observation Scale checksheets are used. A copy of the checksheet is shown.

For the purpose of analysis, a percentage is tabulated for each category of behavior. Each percentage represents the frequency of a behavior in proportion to the tallies for all behaviors.

A summary of the categories of behavior with a brief description of each may be helpful.

#### TEACHER BEHAVIORS

1. Directions; statements, commands, or orders to which a student is expected to comply.

2. Initiates information or opinion: all statements regarding content or process which give information or opinion; included in this category are theoretical questions and demonstrations.
3. Corrective feedback and criticism: statements that are designed to indicate the appropriateness of behavior in a way that enables the student to see that a certain behavior is incorrect or inappropriate and/or why; statements which reject student ideas or behaviors without reference to clearly identifiable authority, external of teacher opinion.
4. Cognitive memory questions: questions requiring the reproduction of facts and other aspects of remembered content, through use of such processes as recognition, rote memory, and selective recall.
5. Broad questions: includes three categories of questions:
  - a. Convergent questions: questions requiring analysis and integration of given or remembered data through use of such processes as translation, association, explanation, and conclusion.
  - b. Evaluative questions: questions requiring a judgment, rating, or choice; these involve matters of judgment rather than matters of fact.
  - c. Divergent questions: questions requiring independent generation of ideas, of taking a new perspective or direction through use of such processes as elaboration, divergent association, and implication.
6. Narrow questions: questions to which the specific nature of the responses can be predicted (e.g., "yes or no" answers with clarification).
7. Accepts or uses ideas of students: statements clarifying building, repeating, answering, or developing ideas and questions elicited by a student.
8. Praise or encouragement: complimenting statements, telling students why what they have said or done is valued, encouraging students to continue, trying to give them confidence in themselves.